the Tertiary age, and that the center of distribution of woodland forms has been the forests of central Europe, while ruderal myrmecochorous forms have radiated from the Mediterranean region. The elaiosomes, in his opinion, have originated in many ways quite independently of the purpose they now serve as factors in distribution.—GEO. D. FULLER.

Anisophylly.—In *Strobilanthes anisophyllus* FIGDOR,[23] experimenting to discover the cause of the development of isophyllous shoots, is satisfied that it is a reversion to juvenile form because seedlings show no anisophylly until they have attained considerable size, and he thinks that it should be possible to prolong isophyllous development indefinitely. He agrees with BOSHART[24] that good nutrition tends to promote isophylly, but takes exception to his statement that anisophylly is to be explained through dorsiventrality. BOSHART[25] in a more recent paper lays emphasis on his former points, such as the asymmetry of the growing point of anisophyllous shoots and the very slight effect of gravity and light. He thinks that the latter factor may affect anisophylly through increasing or decreasing the vigor of the shoot, the weakening favoring asymmetry. He finds, on the contrary, light exercising a direct influence upon the anisophylly of certain species of *Selaginella* and *Lycopodium*.

Anisophyllous rosettes in various species of *Sempervivum* have been experimentally shown by DOPOSCHEG-UHLÁR[26] to result from an inclination of the stem axis toward the horizontal, but whether the response was effected by gravity or light he was unable to determine. The anisophylly seems to disappear toward the close of the growing season and to be renewed early the following spring. The phenomenon in nature is closely associated with the crowded grouping of young plants about the parent rosette in the characteristic multiplication by offshoots.—GEO. D. FULLER.

Morphology of Agathis.—EAMES[27] has investigated the Kauri, the famous timber tree of the Australasian region. Our knowledge of the morphology of the araucarians has lagged behind that of the other coniferous tribes, so that this contribution is very timely. An outline of the results is as follows. Pollination occurs a year after the appearance of the ovulate strobili, and fertiliza-

[23] FIGDOR, W., Das Anisophyllie-Phaenomen bei Vertretern des Genus *Strobilanthes* Blume. Ber. Deutsch. Bot. Gesells. **29**:549–558. 1911.

[24] BOSHART, K., Beiträge zur Kenntnis der Blattasymmetrie und Exotrophie. Flora **103**:91–124. 1911.

[25] BOSHART, K., Über die Frage der Anisophyllie. Ber. Deutsch. Bot. Gesells. **30**:27–33. 1912.

[26] DOPOSCHEG-UHLÁR, J., Die Anisophyllie bei *Sempervivum*. Flora **105**:162–183. 1913.

[27] EAMES, ARTHUR J., The morphology of *Agathis australis*. Ann. Botany **27**:1–38. *figs. 92. pls. 1–4.* 1913.

tion 13 months after pollination. The numerous archegonia are scattered over the broader micropylar portion of the gametophyte. The pollen grains germinate in the axils of the cone scales, before there is any differentiation of a micropyle. The pollen tubes are long and branching and penetrate the cone axis, and also the phloem and even the xylem of the scale traces. The two sperms are somewhat unequal cells with delicate walls, and their nuclei are as large as the egg nucleus. The proembryo is three-tiered, the uppermost tier forming the suspensor, the middle tier the embryo, and the lowest tier a protective cap. The cone scale is said to be structurally double, representing a combination of the bract and scale in Abietineae. It is concluded that the araucarians represent a highly specialized branch of the Coniferales, and that *Araucaria* is probably more ancient than *Agathis*.—J. M. C.

Anatomy of Botrychioxylon.—SCOTT[28] has described in detail the anatomy of *Botrychioxylon*, one of the paleozoic Zygopterideae. As in all the members of this family, a true pith is absent, the primary wood of the stele being intermixed with much parenchyma. Around the whole primary cylinder, as well as around the diarch leaf-trace, is a wide zone of secondary wood, a condition rare or absent in most of the family. The petiolar bundle resembles somewhat that of *Dineuron* or *Metaclepsydropsis*. Because of the unusual development of secondary wood, *Botrychioxylon* is considered by its author to approach the living *Botrychium* more closely than has any previously described form, and to present evidence for the affinity of the Zygopterideae and Ophioglossaceae. This conclusion is in harmony with that general theory, now the subject of much dispute, which derives the true pith of modern ferns from tissue which was primitively stelar.—E. W. SINNOTT.

Fertilization in Gagea.—In *Gagea lutea*[29] the usual double fertilization is the rule, but occasionally both male nuclei fuse with the egg. Another apparently unusual feature is the inclusion of cytoplasm between the fusing nuclei both during the fertilization of the egg and during the fusion of the polar nuclei. The included cytoplasm soon disorganizes. This is the second record of such a cytoplasmic inclusion, the first having been made by BROWN[30] in his study of *Peperomia*. The dispermic fertilization and a study of the literature of chromosome numbers leads NĚMEC into speculations upon the origin of mutation.—CHARLES J. CHAMBERLAIN.

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[28] SCOTT, D. H., On *Botrychioxylon paradoxum*, sp. nov., a paleozoic fern with secondary wood. Trans. Linn. Soc. Bot. **7**:373–389. *pls. 37–41.* 1912.

[29] NĚMEC, B., Über die Befruchtung bei *Gagea*. Bull. Internat. Acad. Sci. Bohême 1912:1–17. *figs. 19.*

[30] BROWN, W. H., The exchange of material between nucleus and cytoplasm in *Peperomia sintenisii*. BOT. GAZ. **49**:189–194. *pl. 13.* 1910.